MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2215)

PEM0044 – ESSENTIAL MATHEMATICS

(All sections / Groups)

20 FEBRUARY 2023
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **FOUR (4) pages** including cover page with **4 Questions** only.
2. Answer all **FOUR (4)** questions
3. Only NON-PROGRAMMABLE calculators are allowed.

Question 1 (25 Marks)

a) For each of the following equation, find the value(s) of x.

i. $(3x-1)(x+3) = 3(x^2-2x+4)$ **(5 marks)**

ii. $5x^2+10x-25=0$; by using quadratic formula **(6 marks)**

b) Simplify the expression and express the answer so that all exponents are positive.

$$\frac{(3x^{-3}y^2z^5)^2}{(-2xy^2z^2)^3}$$ **(6 marks)**

c) Solve the following inequality:

$$-2 < -4(x+2) \leq 6$$ **(8 marks)**

Question 2 (25 Marks)

a) Given a straight line L_1 is parallel to the line L_2: $4y-x=5$ and passing through point $(-3,-5)$. Find the equation of straight line. L_1. Hence, graph L_1 and L_2. **(10 marks)**

b) Given the following quadratic function:

$$f(x) = 2x^2+4x+6$$

Find:

i. intercepts **(2 marks)**

ii. vertex **(5 marks)**

iii. Hence, graph the function. **(3 marks)**

c) Given the following arithmetic sequence:

$$-4, 2, 8, \ldots$$

Find the sum of the first 20 terms. **(5 marks)**

Continued...

Question 3 (25 Marks)

a) Given

$$A = \begin{bmatrix} 2 & 5 & 3 \\ 1 & -4 & 2 \\ 6 & 8 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 9 & 1 & -3 \\ 4 & 7 & 1 \\ 5 & 0 & 2 \end{bmatrix}$$

Find:

i. $A \cdot B$ **(6 marks)**

ii. $-\frac{1}{4}B$ **(3 marks)**

b) Solve the following system of linear equations by using inverse matrix.

$$\begin{aligned} 2x + 3y - z &= -8 \\ 4x - y + 2z &= -6 \\ x + 3y &= 2 \end{aligned}$$

(16 marks)

Question 4 (25 Marks)

a) Differentiate the following function:

$$f(x) = \frac{3x^2 + 5}{x - 2}$$

(7 marks)

b) Solve each of the following integral:

i. $\int \left(3x^2 + \frac{4}{x^2} - \sqrt{x} \right) dx$ **(4 marks)**

ii. $\int 2x^3 (x^4 - 5)^3 \, dx$ **(6 marks)**

iii. $\int_{-2}^{4} \left(2x^2 - 4x + 8 \right) dx$ **(8 marks)**

End of Questions.

Course: Essential Mathematics
Code: PEM0044

Summary of Formulas

Basic Rules of Differentiation

(i) $f'(c) = 0$
(ii) $f'(x) = nx^{n-1}$
(iii) $cf(x)$: $cf'(x)$
(iv) $f(x) \pm g(x)$: $f'(x) \pm g'(x)$
(v) Product rule, $f(x) = u.v$: $f'(x) = uv' + vu'$
(vi) Quotient rule, $f(x) = \frac{u}{v}$; $f'(x) = \frac{vu' - uv'}{v^2}$
(vii) Chain rule: $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
(viii) General power rule: Derive $[f(x)]^n = n[f(x)]^{n-1} f'(x)$

Basic Rules of Integration

(i) $\int k\,dx = kx + C$
(ii) $\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$
(iii) $\int kf(x)\,dx = k\int f(x)dx$
(iv) $\int (f \pm g)(x) = \int f(x)dx \pm \int g(x)dx$

End of Page.